



MASTER OF SCIENCE IN PHARMACOMETRICS

TWO YEARS, PART-TIME, ONLINE

The Master of Science (MS) in Pharmacometrics provides current professionals the ability to acquire skills and knowledge to plan, perform, and interpret pharmacometric analyses with the goal of influencing key drug development, regulatory, and therapeutic decisions. The online program offers theoretical and applied technical knowledge together with necessary business skills tailored for the pharmaceutical sector. All courses will follow case-based study and teaching.

WHAT'S IN IT FOR ME?

Graduates of the MS in Pharmacometrics program will be highly sought after by pharmaceutical companies, regulatory agencies, and other research organizations. Given the tremendous growth potential of the field of pharmacometrics, graduates of this program will see accelerated professional growth. The program also equips scientists to interact with interdisciplinary teams more effectively and provides them with the tool kit needed to perform independent research.

WHO SHOULD APPLY?

Professionals with bachelor's, master's or doctoral degrees with some experience in medical product development who aspire to transform into decision-making pharmacometricians or quantitative translational scientists should apply. The program is designed for professionals with full- or part-time jobs in areas such as **pharmacy, pharmacology, engineering, statistics, pharmaceutical sciences, and epidemiology.**

COURSE LISTING

PHMX 601 BASIC PHARMACOMETRIC TOOLS (FALL, 3 CREDITS)

Pharmacometric projects require mastery of new and advanced tools to conduct modeling and simulation. Students will be introduced to: Phoenix, NONMEM and R. Basic operations such as importing and restructuring data, performing summary statistical analysis and plotting will be taught. The goal, however, is not to provide the theory to interpret the data or the analysis output. The other courses in the MS Pharmacometrics program are designed to complement the tools training received in this course. This is a mandatory course to be taken in the first semester of the MS program.

PHMX 602 BASIC PKPD MODELING

(FALL, 3 CREDITS)

Understanding pharmacokinetics (PK) and pharmacodynamics (PD) provides the pivotal basis for dosing and other related decisions during drug development and its use in clinic. This course will provide training in the fundamentals of PK and PD modeling and their application to decisions. Theoretical concepts pertaining to analyzing PKPD data, in an average subject, both from mechanistic and statistical points of view, will be taught. The course also includes hands-on training using standard modeling and simulation software. This is a mandatory course to be taken in the first semester of the MS program.

PHMX 663 STATISTICS FOR PHARMACOMETRICIANS I

(SPRING, 3 CREDITS)

The field of pharmacometrics requires good understanding of statistical concepts. This course will provide the basic statistical principles required for a pharmacometrician. This introductory level course will strengthen the student's understanding of pharmacokinetic-pharmacodynamic modeling aspects. The course material is tailored for pharmacometricians.

Prerequisite course: PHMX 601

PHMX 665 DOSE-RESPONSE TRIALS

(SPRING, 3 CREDITS)

Knowledge of designing and analyzing dose-response is an important component of a drug development or regulatory review. Basics of the variety of dose-response designs such as parallel, cross-over, flexible-dose, titration, withdrawal, adaptive and enrichment trials will be explained. Students will perform clinical trial simulations for supporting the choice of appropriate designs and analyses. Innovative designs and data analysis make characterizing dose-response feasible within the realms of drug development. The information

generated from such trials is key for both approval of new drugs as well as for drug product labeling.

Prerequisite course: PHMX 601

PHMX 666 STRATEGIC COMMUNICATION & NEGOTIATIONS (SUMMER, 2 CREDITS)

This course will improve students' abilities to communicate strategically and to negotiate. Students will be able to identify their communication style and will learn how to compensate for any weaknesses. Scientists in life sciences will need to work with interdisciplinary scientists with diverse backgrounds. Pharmacometrics has not reached its full potential yet and is breaking new ground. In order to influence key decisions during drug development, regulatory review or in clinics, pharmacometricians will need to communicate in a manner that is simple, persuasive, and effective. Implementation of model-based drug development calls for change from current practice, and such changes are often resisted. Scientists will need to master how to effectively negotiate amid diverse opinions to lead a team towards consensus, especially when they lack authority to implement solutions.

PHMX 638 INTERMEDIATE PKPD MODELING I (SUMMER, 3 CREDITS)

This course introduces population analysis concepts and includes hands on training. Knowledge of conducting pharmacometrics analysis is an important component of the drug development and regulatory project. However, integrating all the different pieces together is equally important. This course will guide students on how to frame the appropriate questions, engineer the analysis, interpret the results, and communicate to influence the decision-making process in drug development. This course integrates the essence of all the coursework in the program, and allows the students to appreciate the totality of a typical pharmacometrics project that is essential for decisions regarding new drug development.

Prerequisite courses: PHMX 602, 663

PHMX 747 INTERMEDIATE PKPD MODELING II (FALL, 3 CREDITS)

Conducting population analyses and interpreting complex datasets is pivotal for several decisions such as "go-no-go" dose selection for various patients. Theoretical concepts pertaining to analyzing PKPD data, collected from several subjects, both from mechanistic and statistical points of view, will be taught. Because data from several subjects will be analyzed simultaneously, the course will include advanced modeling techniques such as nonlinear mixed effects modeling. Further, advanced modeling such as physiologically-based PK modeling and absorption-metabolism simulations will also be introduced. The course also includes hands-on training using standard modeling and simulation software.

Prerequisite courses: PHMX 638, 663

PHMX 759 STATISTICS FOR PHARMACOMETRICIANS II (FALL, 3 CREDITS)

Understanding clinical trial data with binary, ordinal, count, and time-to-event outcomes requires specific understanding of statistical concepts. This intermediate level course will introduce application of statistical techniques like logistic regression, Poisson regression, and survival analysis. The course will also demonstrate simulation techniques associated with discontinuous outcomes. R software will be used to demonstrate the application of statistical aspects. Simulated and real data from experiments and clinical trials will be employed for practice and homework.

Prerequisite courses: PHMX 638, 663

PHMX 758 SPECIAL TOPICS (PROJECT) (SPRING, 1 - 7 CREDITS)

Research projects can be selected from a set of pre-defined projects provided by the Center for Translational Medicine (CTM). Students can also use projects from their organizations towards the research. The projects will need to be identified by the end of the first year. CTM staff will guide the students.

Prerequisite courses: PHMX 747, 759

HOW TO APPLY

The application deadline for the program is **May 1** of each year. Applications are viewed on a rolling basis. Applicants are encouraged to submit all of their materials early. Applications received beyond the deadline will be considered for the next cohort. To apply, visit www.pharmacy.umaryland.edu/admissions/pharmacometrics, for additional instructions as well as more details on the admissions process.

Required materials to apply:

- Official transcripts
- Three letters of recommendation
- A statement of academic goals and research interests
- TOEFL/IELTS Scores (required for international students)

GRE scores are not required for admission decision.

CONTACT US

For more information about the program, current and prospective students can contact us at execms@rx.umaryland.edu.